



ENGLISH

BATTERY-POWERED SYSTEMS FOR DOMETIC AUXILIARY AIR CONDITIONING SYSTEMS

INSTALLATION GUIDELINES

Dometic Corporation, Environmental Division
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WARNING:

Only trained technicians should perform these checks and tests. These units contain voltage of 12VDC, 24VDC, 115VAC and/or 230VAC. Some of these voltages can be lethal. These units also contain refrigerant under high pressure. Refrigerant circuits should only be accessed by licensed technicians.

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NOTES AND WARNINGS

IMPORTANT

The Dometic battery-powered air conditioning system is an integrated package of components which have been carefully selected and tested to work together for proper performance. The system includes:

- ***Inverter (or optional inverter with built-in charger)***
- ***High-capacity alternator with external regulator***
- ***AGM Group 31 batteries***
- ***Shorepower connection (optional)***
- ***Inside AC power plugs (optional)***
- ***Dometic air conditioning units with digital controls***

Do not substitute any other components than those specified by Dometic. Using non-standard components may not provide the performance specified by Dometic and may void your warranty for the air conditioning system.

BEFORE YOU START

- Realize that all the manuals are written to inform an installer that is skilled in mechanical areas, such as alternators, batteries, and cabling, as well as skilled in HVAC and electrical areas. If you have any questions after reading this and all manuals that accompany the individual parts, please call 804-746-1313, and ask for the Dometic Truck Applications Department.
- Open all boxes and check conditions of parts. If parts are damaged, please file the appropriate forms with the shipping company. If parts are missing, please contact Dometic.
- Refer to Technology and Maintenance Council (TMC) RP160 for guidelines on inverter wiring.
- Realize that all parts required may not necessarily be included, such as:
 - Battery cables
 - Cable secondary protection (wire loom)
 - Some fasteners (i.e., wire ties)
 - All tools (i.e., frame drill, bits, wrenches, drills, hole saws)
(Note that it is highly recommended that the called-out tools be used when called for)
 - General shop supplies

GETTING THE MATERIALS TOGETHER

- Open all boxes and lay out materials in areas with parts that will be used for the same type of system.

TOOLS THAT MAY BE REQUIRED

- See each individual manual for a list of the tools required.

UNDERSTANDING LOW VOLTAGE DISCONNECTS (LVD)

There are two different LVDs we are going to discuss: the one that is integral to the truck, and the one that is integral to the Battery-Based HVAC System. The truck's LVD shuts down at approximately 12.3 VAC. The HVAC's LVD shuts down at approximately 10.5 VDC, which yields an open circuit volt (OCV) of approximately 11.5 VDC. This means that during the normal run process of the HVAC system, truck systems will shut down before the HVAC will.

INSTALLING THE BATTERIES

You will replace the standard lead-acid batteries with absorbed glass mat (AGM) batteries (Fig. 1) and also add extra AGM batteries to get extended time running on battery power.

The first step is to find space for the extra batteries and inverter. Note that whenever possible the inverter should be mounted in the same box with the batteries.

Available space will vary based on the truck specifications, such as frame length, fuel tank length and empty tool boxes already on the truck.

If additional boxes are included in your kit, you will need to mount them firmly to the frame of the truck. This may require that some slight adjustments be made to fuel tank placement. Be creative, however, always be cautious, as any changes you make could cause problems elsewhere.

If you choose to use boxes already installed on the truck for additional batteries make sure they are rated for the weight of the batteries and inverter.

Never disregard OEM suggestions relating to frame welding and drilling, as they are very important.

Consider center-mount battery boxes (Fig. 2). Freightliner and Volvo offer center-mount boxes that offer four battery spaces.

Dometic offers a range of battery boxes that will mount on the side of the frame well and a center mount box, which mounts between the rails, just behind the cab. Refer to Dometic Publication L-2328 for more information.

These boxes are typically offered pre-loaded with components. However, the boxes can also be purchased empty.



Figure 1 – AGM batteries replace standard lead-acid batteries

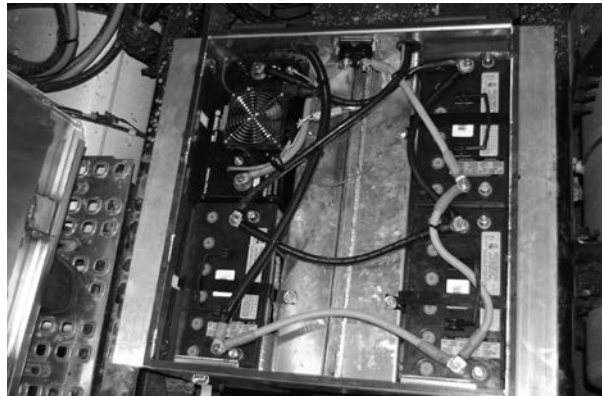


Figure 2 – Center-mount battery box

INSTALLING ADDITIONAL BATTERY BOXES

Boxes should be mounted with cabling in mind. The shorter the cables the less voltage drop and the less chance for chafing and rubbing.

Mount Dometic battery boxes with four bolts, either supplied with the box, or Grade 8 fasteners of at least 5/8" diameter. Some battery boxes come with a clamp-on mounting solution. Depending on the mounting location, you may be able to utilize all four clamps, or you may have to use a combination of clamp-on vs. through bolting. The final strength of the bolting solution on the frame rests with the installer. Washers on both sides with a locking nut (ny-lock, tri-lobe or stover) are suggested. Lock washers are not recommended. Torque 5/8" bolts to 140-155 ft-lbs. Torque 3/4" bolts to 260-280 ft-lbs.

Drill the frame for at least four bolts in the vertical section (web). Most OEMs do not allow drilling in the horizontal sections. Most OEMs also do not allow welding or torching frames. Please be sure that whatever you do meets OEM requirements, so as not to void any warranties.

WIRING THE NEW BATTERIES

Before installing any batteries, load test each one. One bad battery can ruin the entire bank. And yes, sometimes brand new batteries can be bad.

Batteries can be wired in one of two methods: A dual-bank system (house and starting), and a single-bank system. The dual-bank system provides redundancy, while the single-bank system provides for less total

weight, complexity and number of batteries. Use the wiring diagrams at the back of the manual for different wiring configurations (Fig. 3). Conductors between each battery should be of the same size as conductors between each bank. We normally recommend at least 2/0 gauge.

Conductors should be as short as possible and should be routed and clipped securely so as to prevent chafing and rubbing.

Secondary chafe protection (wire loom) is recommended on AT LEAST the positive conductors between banks. It is also recommended that chafe protection be placed in chafe-prone areas on the negative wire.

If you make your own cables, either crimp the end on the cable with the correct tool or solder it on. There are cable ends available with the solder already in the end. Either way, it is suggested that the connection be covered with heavy-duty heat shrink. This helps to prevent corrosives from being wicked up into the copper strands, where they can cause hidden corrosion.

Before and during connection of battery terminals, apply a light coating of the supplied dielectric grease (in the small clear packet) to every connection. This will help keep corrosion and voltage drop to a minimum.

Replace the hex or wing nuts on the batteries with the supplied locking hex nuts. These will help keep the connections tight over the long haul. Tight connections will ensure less voltage drop.



Figure 3 – Batteries connected

INSTALLING THE BATTERY FUEL GAUGE

Follow the manufacturer's instructions to install the battery fuel gauge.

The shunt must be connected between the last battery and the inverter negative post. You may install the shunt at the battery or at the inverter. The aluminum bar may be moved to accommodate either.

Make sure that you attach the shunt with the polarity correct by following the labels marked "Load" and "Battery."

Attach the small red wires to the positive battery post.

If the cables need to be extended, use conductors of the same size. Connections that are outside should be at least butt-connected and covered in outside-rated shrink tube. Waterproof plugs are also a good method.

The battery fuel gauge display should be mounted in an easily accessible place, probably the same area in which you will mount the HVAC or inverter controls. Consider first the area at the head of the bed (driver's side of the truck). Usually the truck's HVAC controls are mounted here and provide a wire chase for your use.

The fuel gauge requires a hole size of a standard round truck gauge. A hole saw of 2 1/8" gives the correct mounting hole.

INSTALLING THE INVERTER

Follow the manufacturer's instructions. Here are some other suggestions:

The inverter should be installed in the same box as the batteries, so as to keep the cable lengths short, reducing voltage drop to a minimum.

Mount the inverter directly to the metal of the box, with no material or spacer in between.

Make sure to ground the chassis of the inverter to the chassis of the truck. Note that 12-gauge wire is acceptable for this requirement.

Install the Dometic 200 amp circuit breaker or a properly-sized fuse in the positive cable between the last battery and the inverter.

Note: If the inverter is to be installed anywhere other than in the battery box, consult Dometic Truck Engineering.

OPTIONAL: INSTALLING THE INVERTER/CHARGER

The inverter/charger and controls will be installed in the same manner as the inverter (Fig. 4). However, the inverter/charger will be connected to the shorepower connection (to be discussed later in this manual).



Figure 4 – Inverter/Charger installed

INSTALLING THE INVERTER CONTROLS

The inverter controls should be mounted in an easily accessible place, probably the same area in which you will mount the HVAC controls (Fig. 5). Consider first the area at the head of the bed (driver's side of the truck). Usually the truck's HVAC controls are mounted here and provide a wire chase for your use.

If you are installing in a day cab, and the inverter controls consist of a switch that measures 3/4" x 1 1/2", then you can remove the switch from the panel and install it into an empty dash switch location.

If the cables need to be extended, use conductors of the same size. Connections that are outside should be at least butt-connected and covered in outside-rated shrink tube. Waterproof plugs are also a good method.



Figure 5 – Inverter control installed

INSTALLING THE ALTERNATOR

Follow the instruction manual included with the alternator/regulator. Here are a few additional tips.

The new alternator should directly replace the existing one (Fig. 6) (i.e., pad mount or J180 mount). If not, you need to request the correct model.

The alternator amp rating is based on the number of batteries in your system and may be different on different applications.

You will have to reuse the alternator pulley.

The alternator cabling will have to be upgraded to a 2/0 cable for a 270-amp alternator (typically a day cab) or a 3/0 cable for a 320-amp alternator (most sleepers). Run this cable from the positive alternator stud to the positive starter stud. (See page 20 for instructions on FTL Cascadia.)

Note: On Volvo trucks, you will have to add a 3/0 cable from the truck-side of the negative fuse (see Battery-Volvo diagram on page 21) to the chassis stud located just to the inside of the frame rail behind the driver's side from tire.

Alternator power wiring may have to be upsized or paralleled with an additional cable if the OEM cable size is not able to conduct the required current. Refer to the alternator literature for guidance.

The negative cable must be attached to the negative terminal on the alternator and the negative terminal on a battery. **It must not go just to chassis ground.**

Secondary chafe protection (wire loom) is recommended on AT LEAST the positive conductor. It is also recommended that chafe protection be placed in chafe-prone areas on the negative wire.

If you make your own cables, either crimp the end on the cable with the correct tool or solder it on. There are cable ends available with the solder already in the end. Either way, it is suggested that the connection be covered with heavy-duty heat shrink. This helps to prevent corrosives from being wicked up into the copper strands where they can cause hidden corrosion.

Make sure that all connections are tight, as loose connections can cause the regulator not to work correctly.

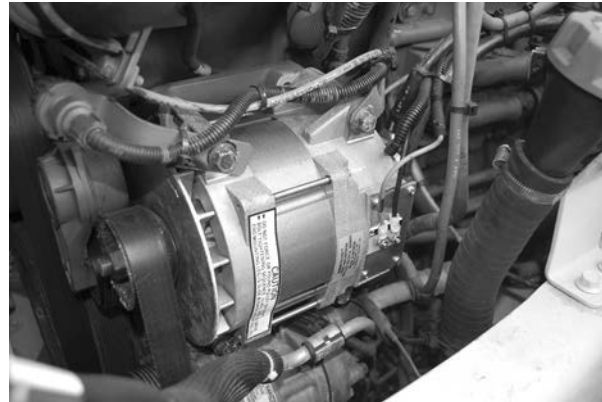
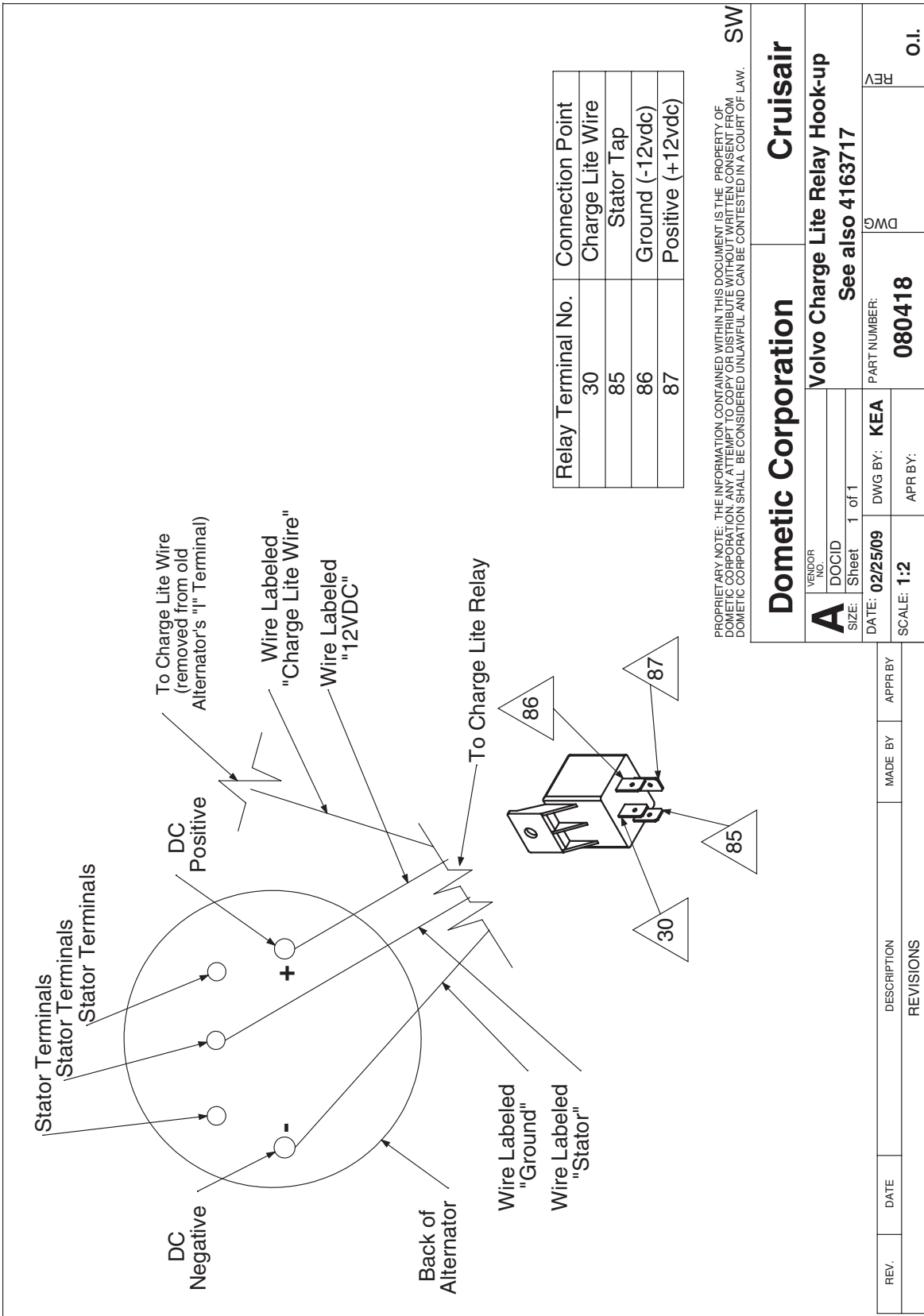


Figure 6 – Alternator installed

DASH CHARGE LIGHT

Note for all Volvo Trucks: If your existing alternator has an "I" terminal with wire attached, you may need to add a relay to make the "Alternator" or "Charge" dash light work correctly. One way to tell is if the existing alternator has a wire hooked to the "I" terminal. If the new alternator does not have this terminal, then you will need the charge light relay. If you do not already have the charge light relay, request Dometic P/N 4163717. This wire will later be used to connect to the charge light relay. See drawing "Charge Light Circuit for Alternators" below. The relay required is a small flange-mount 12VAC relay, like Song Chaun #792H, Tyco #V23234A0001X036, Bosch #0 332 209 150, Dometic P/N 4135000 or P/N 4135010.

CHARGE LIGHT CIRCUIT FOR ALTERNATORS WITH INTEGRAL (Built-In) REGULATORS



TESTING THE ALTERNATOR

Alternator voltage test. Connect the test leads of a volt meter to the alternator output terminals. **Note:** *Most Leece Neville alternators have isolated ground rectification. Always connect tester/volt meter directly to the negative output terminal of the alternator or your test will be inaccurate.*

- **Start engine, increase to high idle (1500 RPM):** The volt meter should now indicate that the alternator output voltage has increased to a range from 13.8 volts to 14.2 volts. (Ensure that all electrical accessories of the vehicle are in the off position.) If voltage increases but is out of range, inspect to see if the alternator has an adjustable regulator. If so, reduce engine speed to idle and adjust voltage to a setting of 14.0 volts. If voltage is higher than 14.7 volts and cannot be adjusted below 14.25 volts, or if voltage is lower than 13.8 volts and cannot be adjusted into range, then replace the alternator. For more information, please reference Leece-Neville Technical Publication, TSB-1019.

WIRING THE "IGNITION INTERLOCK" ON THE HVAC UNIT

- If your HVAC is provided with an "Ignition Interlock" cable, then follow these steps to properly connect it.
 1. Connect the white wire from the "Ignition Interlock" cable to the "ON" position of the key switch. Here are some suggestions:
 - Volvo - in the sleeper control panel cabling - wire F60A1-08
 - FTL Cascadia - wire under passenger dash to connector X-6 of the SAM-Cab, pin #10
 - International Prostar - pink wire labeled "A13EE" in the driver's side luggage box.
 2. Connect the black wire from the "Ignition Interlock" cable to grounded, metal chassis connection.
- Start the HVAC unit. Turn the key to the "ACC" position. If the HVAC turns off when the ignition is in the "ACC" position, you need to revise your connection. Use a voltmeter to ensure that your connection point allows for power **ONLY** when the keyswitch is in the 'ON' position.

WIRING THE 120VAC POWER TO THE HVAC UNIT

Follow the directions and wiring diagrams in your air conditioner installation manual.

The connection of the 120VAC cable to the inverter should be done with either the extension cable or the Y-cable assembly. Dielectric grease should be applied to any connections outside of the cab structure. "Splicing" outside of the cab without taking precautions for waterproofing is not permissible and may void your warranty.

Only as many extensions as required should be used.

Cables should be routed and clipped securely so as to prevent chafing and rubbing.

The connection at the HVAC unit should be done with the supplied plug.

OPTIONAL: INSTALLING 120VAC OUTLETS INSIDE THE SLEEPER

If so equipped, the system will have 120VAC outlets that can be installed inside the sleeper for accessory use. The outlets may be installed anywhere inside the sleeper, however, they should be installed in an area that makes sense for the loads the driver will be applying (i.e., probably near one cabinet or the other).

The outlets should be installed with the Y-cable connection to the main cable between the inverter and the HVAC unit.

OPTIONAL: INSTALLING SHOREPOWER CONNECTION

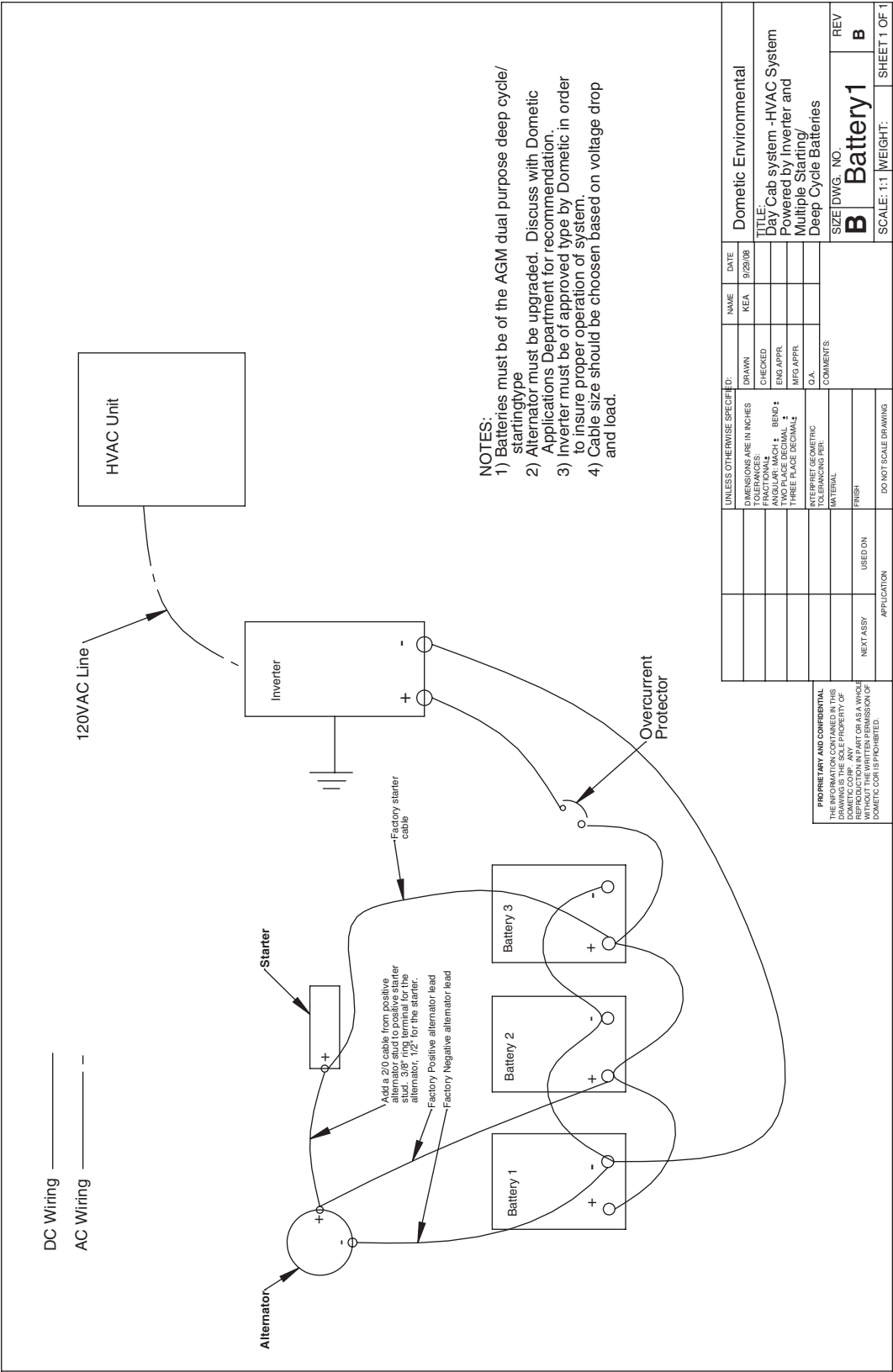
The shorepower connection is only available with the inverter/charger.

The shorepower connection should be installed preferably on the driver's side of the truck. If the driver's side of the truck is not in reach of the battery box in which the inverter/charger is mounted, then the connection should be installed as close to the inverter/charger as possible (Fig. 8). This will probably be in the side of the battery box in which the inverter/charger is mounted.



Figure 8 – Shorepower connection installed

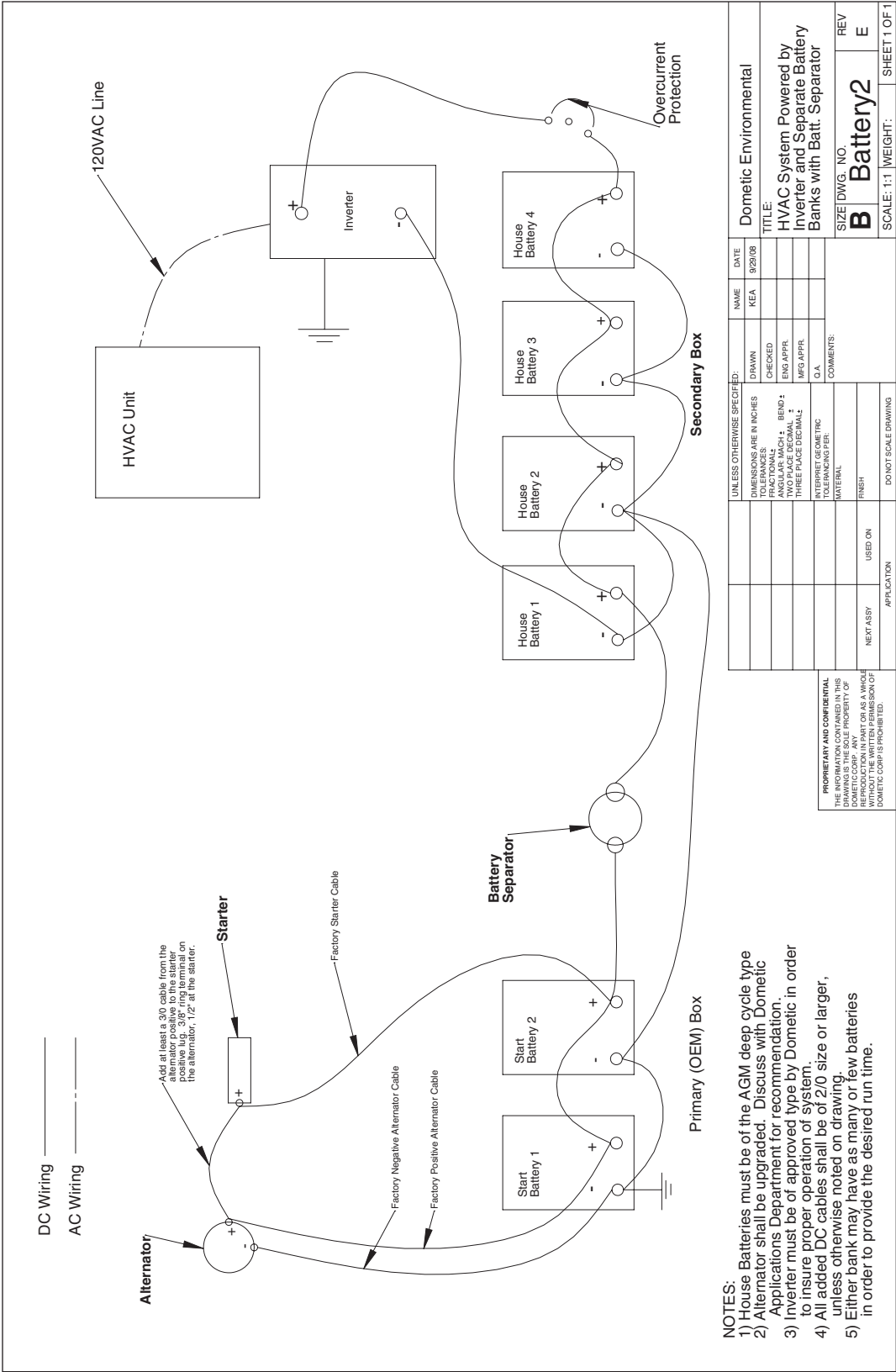
HVAC SYSTEM POWERED BY INVERTER AND MULTIPLE STARTING/DEEP CYCLE BATTERIES



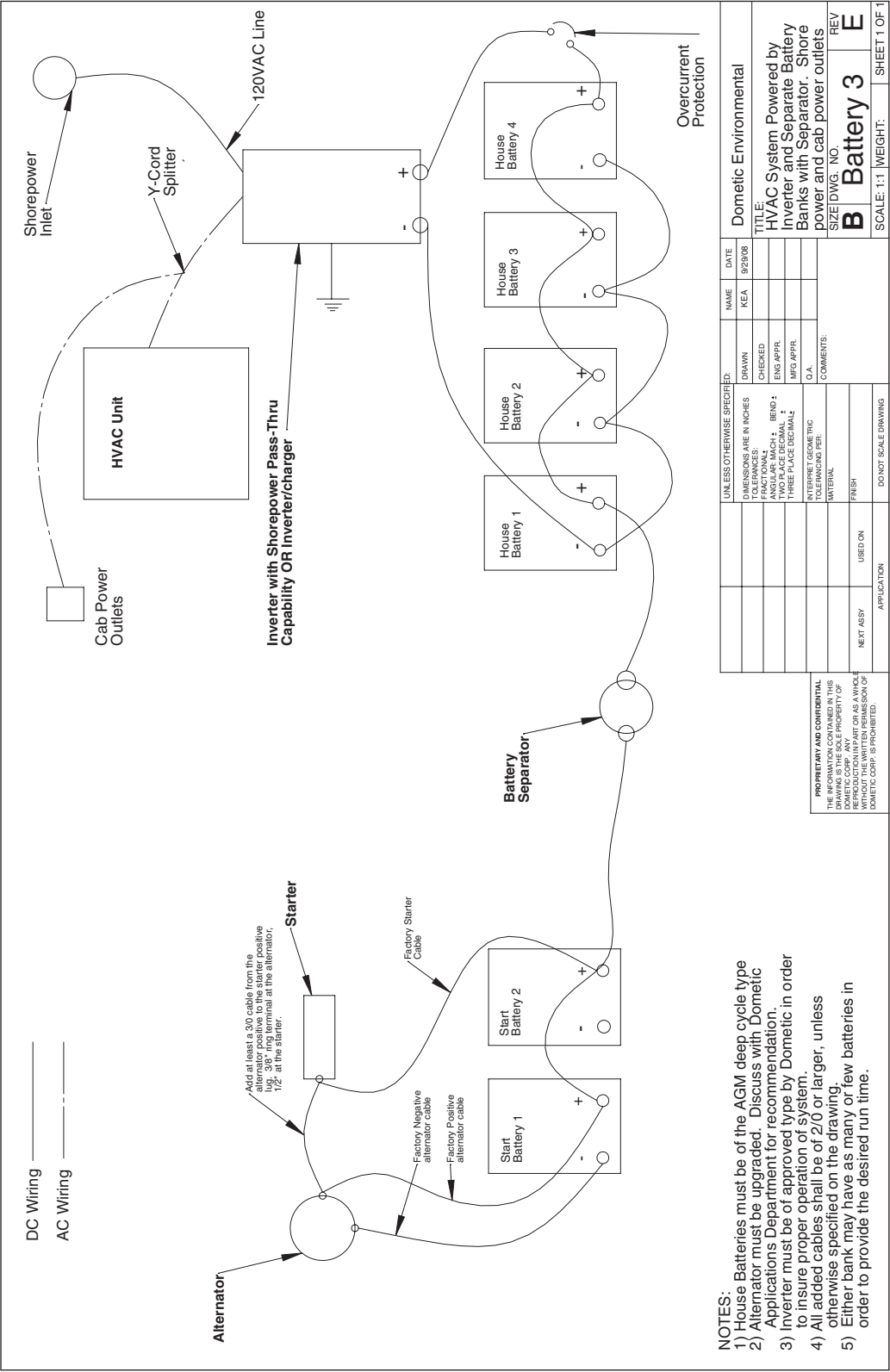
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DIMENSIONS ARE IN INCHES	KEA	9/29/08	
TOLERANCES:			
FRACTIONS	CHECKED		
DECIMALS	ENG APPR		
ANGULAR: EACH ± BEND ±	MFG APPR		
TWO PLACE DECIMAL ±	Q.A.		
THREE PLACE DECIMAL ±	COMMENTS		
INTERPRET GEOMETRIC TOLERANCES PER:			
MATERIAL			
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APPLICATION	NEXT ASSY	USED ON	REV
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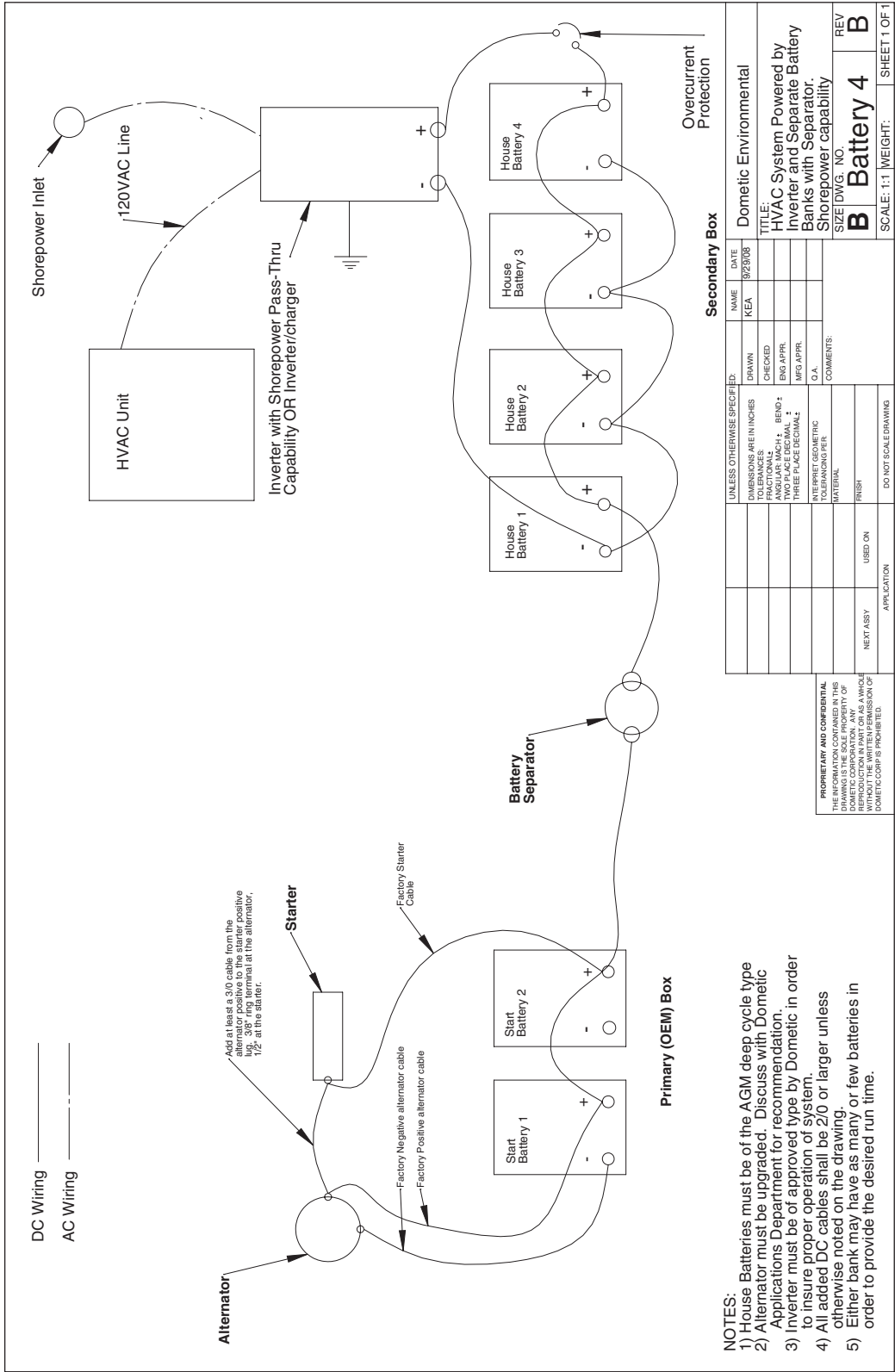
HVAC SYSTEM POWERED BY INVERTER AND SEPARATE BATTERY BANKS WITH BATTERY SEPARATOR



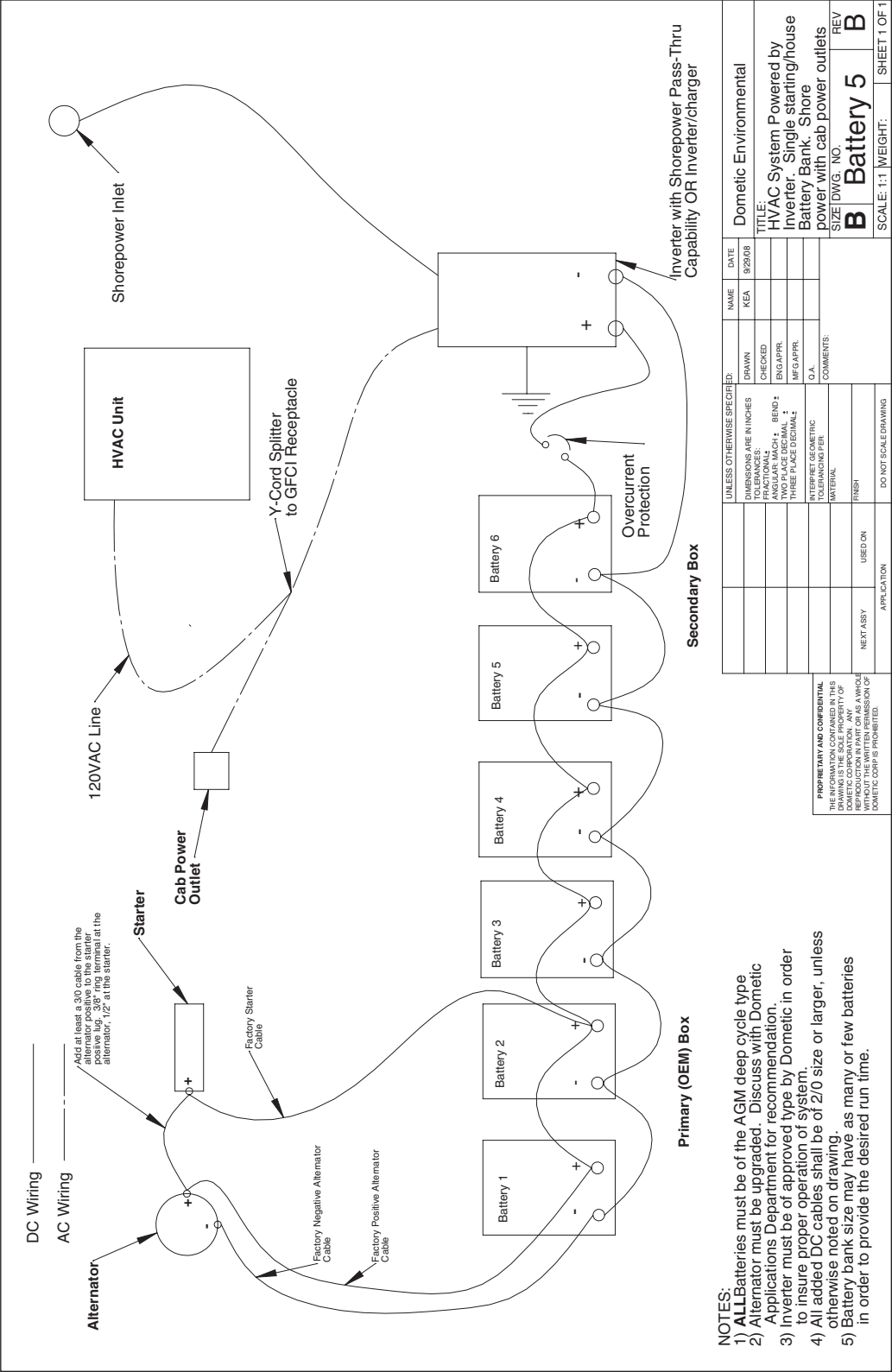
HVAC SYSTEM POWERED BY INVERTER AND SEPARATE BATTERY BANKS WITH SEPARATOR - SHOREPOWER AND CAB POWER OUTLETS



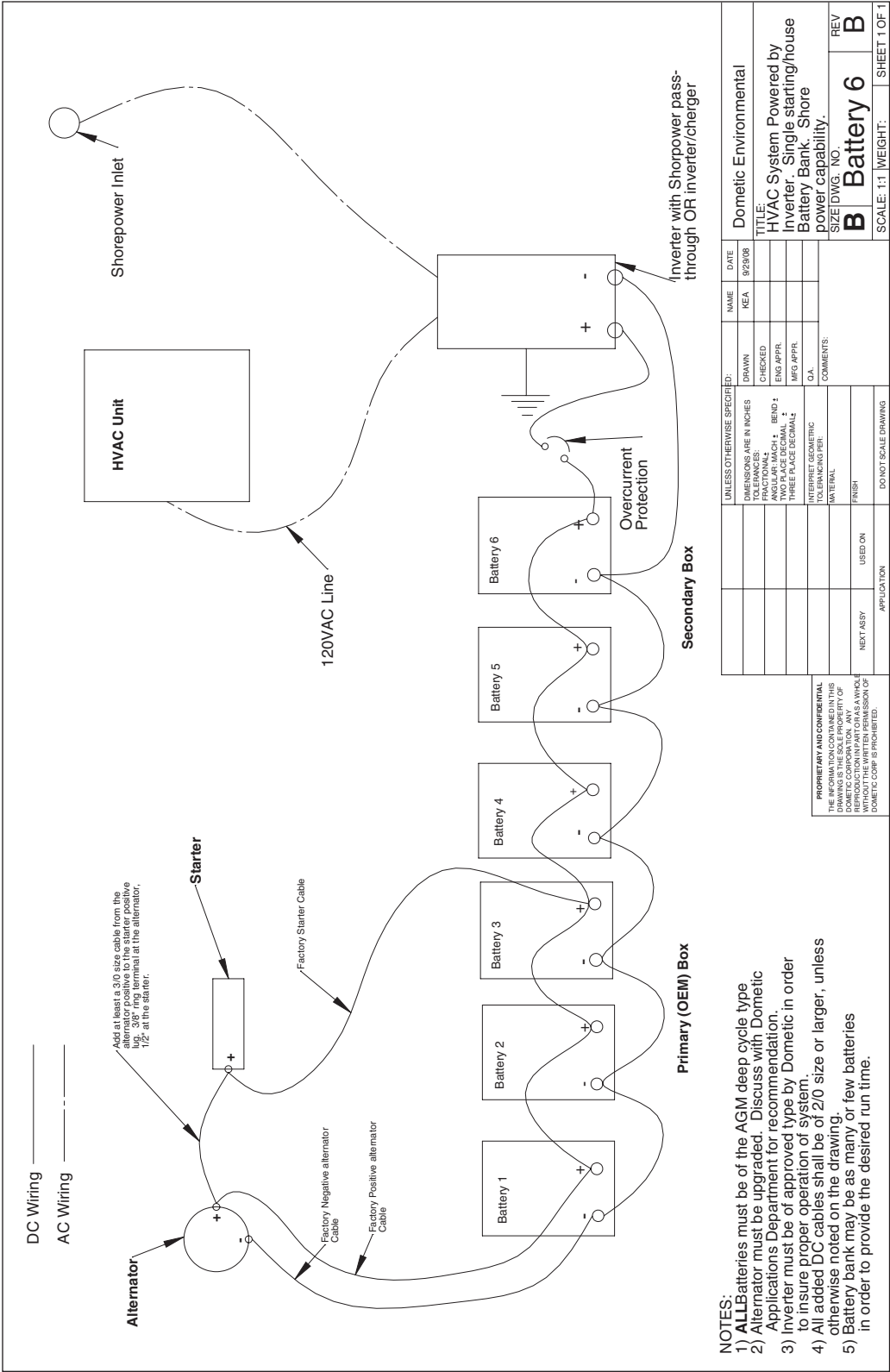
HVAC SYSTEM POWERED BY INVERTER AND SEPARATE BATTERY BANKS WITH SEPARATOR - SHOREPOWER CAPABILITY



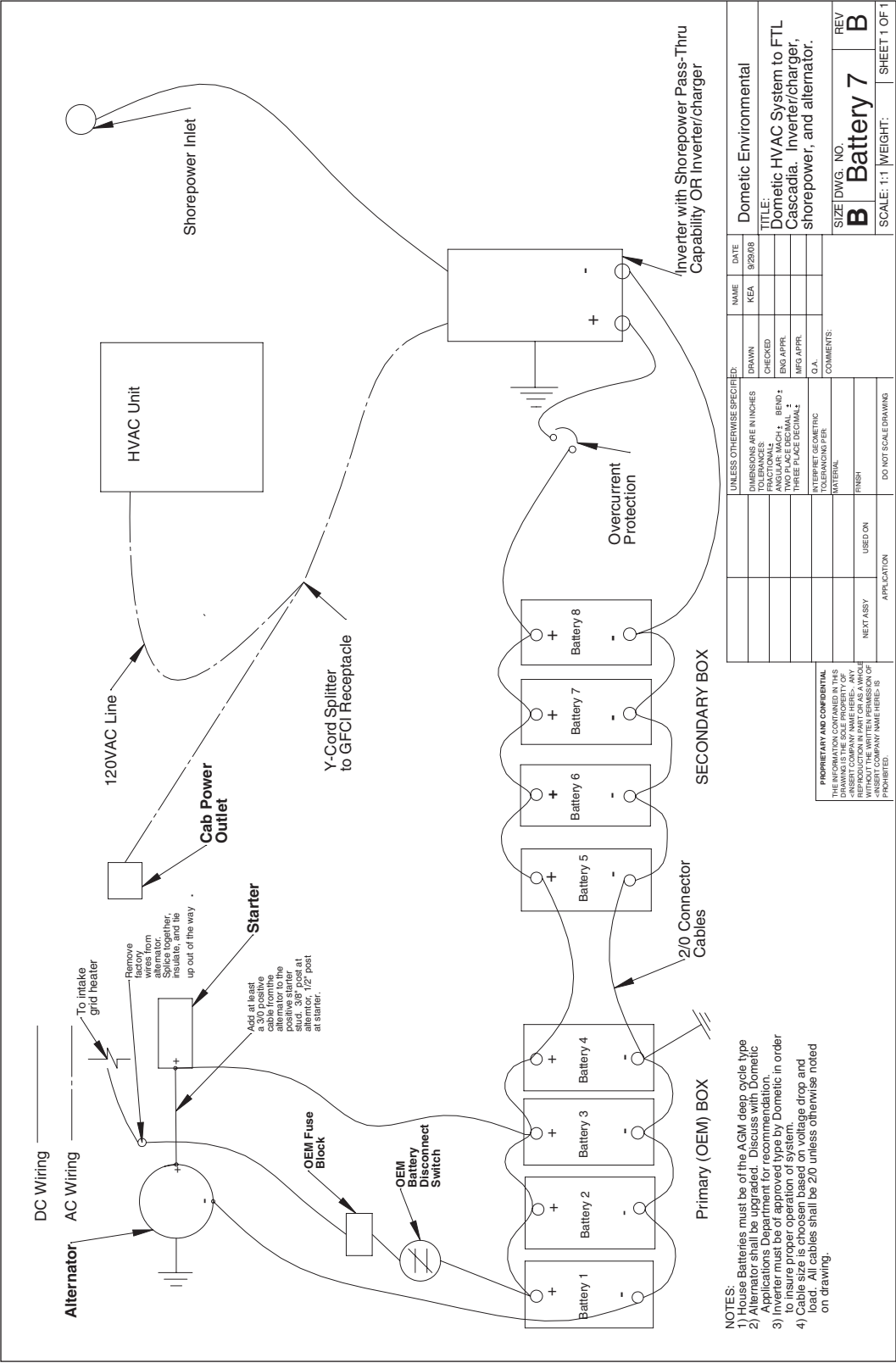
HVAC SYSTEM POWERED BY INVERTER - SINGLE STARTING/HOUSE BATTERY BANK - SHOREPOWER WITH CAB POWER OUTLETS



HVAC SYSTEM POWERED BY INVERTER - SINGLE STARTING/HOUSE BATTERY BANK - SHOREPOWER CAPABILITY



DOMETIC HVAC SYSTEM TO FTL CASCADIA – INVERTER/CHARGER, SHOREPOWER, AND ALTERNATOR REGULATOR



NOTES:



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